

### ABSTRACT

The invention discloses a system, method and medical device for measuring various hemoglobin derivatives, such as oxyhemoglobin, reduced hemoglobin, partial hemoglobin, carboxyhemoglobin, methemoglobin and sulfhemoglobin in whole or in 5 hemolyzed blood. The novel method uses a statistical approach to enable the design of a portable co-oximeter. This portable co-oximeter utilizes compact light sources, such as light emitting diodes or light emitting lasers, to emit light in the visible region. Being portable, the device is a point-of-care device that can be used in emergency situations by paramedics, in the emergency room, and in a physicians office to detect 10 and measure the concentrations and/or percentages of functional and non-functional hemoglobin derivatives in a patient's blood.